

Key Native Ecosystem Operational Plan for Strang's Bush

2022-2027



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1 Purpose

The purpose of the five-year Key Native Ecosystem (KNE) Operational Plan for Strang's Bush KNE site is to:

- Identify the parties involved
- Summarise the ecological values and identify the threats to those values
- Outline the vision and objectives to guide management decision-making
- Describe operational activities to improve ecological condition (eg, ecological weed control) that will be undertaken, who will undertake the activities and the allocated budget

KNE Operational Plans are reviewed every five years to ensure the activities undertaken to protect and restore the KNE site are informed by experience and improved knowledge about the site.

This KNE Operational Plan is aligned to key policy documents that are outlined below (in Section 2).

2 Policy Context

Under the Resource Management Act 1991 (RMA)¹ Regional Councils have responsibility for maintaining indigenous biodiversity, as well as protecting significant vegetation and habitats of threatened species.

The KNE programme funding is allocated for under The Greater Wellington Long Term Plan (2021-2031)² and is managed in accordance with The Greater Wellington Biodiversity Strategy³ that sets a framework for how Greater Wellington protects and manages biodiversity in the Wellington region. Goal One of the Biodiversity Strategy - *Areas of high biodiversity value are protected or restored* - drives the delivery of the KNE Programme.

Other important drivers for the KNE programme include the Proposed Natural Resources Plan⁴, the Regional Pest Management Plan 2019-2039⁵ and Toitū Te Whenua Parks Network Plan⁶.

3 The Key Native Ecosystem Programme

The KNE Programme is a non-regulatory programme. The programme seeks to protect some of the best examples of original (pre-human) ecosystem types in the Wellington region. Sites with the highest biodiversity values have been identified and prioritised for management.

KNE sites are managed in accordance with five-year KNE plans prepared by Greater Wellington's Biodiversity department. Greater Wellington works with the landowners, mana whenua and other operational delivery providers to achieve mutually beneficial goals.

KNE sites can be located on private or publicly owned land. Any work undertaken on private land as part of this programme, it is at the discretion of landowners, and their involvement in the programme is entirely voluntary. Involvement may just mean allowing work to be undertaken on that land. Land managed by the Department of Conservation (DOC) is generally excluded from this programme.

Sites are identified as of high biodiversity value for the purposes of the KNE Programme by applying the four ecological significance criteria described below.

Representativeness	Rarity/ distinctiveness	Diversity	Ecological context
The extent to which ecosystems and habitats represent those that were once typical in the region but are no longer common place	Whether ecosystems contain Threatened/At Risk species, or species at their geographic limit, or whether rare or uncommon ecosystems are present	The levels of natural ecosystem diversity present, ie, two or more original ecosystem types present	Whether the site provides important core habitat, has high species diversity, or includes an ecosystem identified as a national priority for protection

A site must be identified as ecologically significant using the above criteria and be considered "sustainable" for management in order to be considered for inclusion in the KNE Programme. "Sustainable" for the purposes of the KNE Programme is defined as: a site where the key ecological processes remain intact or continue to influence the site and resilience of the ecosystem is likely under some realistic level of management

4 Strang's Bush Key Native Ecosystem site

Strang's Bush is a 30 ha forest remnant in the Eastern Wairarapa Ecological District⁷. It is located on a privately-owned sheep and beef farm 13km southeast of Carterton, near Gladstone (Appendix 1, Map 1). A minor tributary of the Makahakaha Stream runs through the middle of the KNE site. Originally the KNE site was part of three paddocks and much of it was grazed until 2016 when it was fully fenced and partially retired. The north-western area contains significant tōtara (*Podocarpus totara*) and tītoki (*Alectryon excelsus*) forest remnants and has been retired from grazing for longer than the rest of the site. These remnants constitute one of the best examples of lowland podocarp forest remaining in the Wairarapa area.

5 Parties involved

There are many organisations, groups and individuals that play important roles in the care of the KNE site.

5.1 Landowner

This KNE site and surrounding farm is owned by the Strang family. Jamie and Marilyn Strang are particularly keen to see an increase in bird numbers in the KNE site and surrounding area. The current farm leasee is supportive of the programme plan and restoration efforts. The Strang family and the farm lessee have expressed interest in restoring the Makahakaha stream and surrounding wetland areas.

5.2 Operational delivery

Within Greater Wellington, three departments are responsible for delivering the KNE operational plan.

- The Biodiversity department is the overarching lead department for Greater Wellington on the longer term planning and coordination of biodiversity management activities and advice within the KNE site. The Biodiversity department's KNE budget funds the Biosecurity department to coordinate and carry out pest control activities.
- The biosecurity department coordinates and implements pest controls measures at the KNE site.
- The Land Management department have developed a Farm Environment Plan⁸ for the wider Strang's Bush property that primarily aims to reduce hill-slope soil erosion. Land Management has also supported fencing and native planting around streams in the surrounding farmland.

6 Ecological values

This section describes the various ecological components and attributes that make the KNE site important. These factors determine the site's value at a regional scale and how managing it contributes to the maintenance of regional biodiversity.

6.1 Ecological designations

Table 1, below, lists ecological designations at all or part of the Strang's Bush KNE site.

Table 1: Designations at the Strang's Bush KNE site

Designation level	Type of designation
Other	The majority of the KNE is a DOC Designated Ecological Site.

6.2 Ecological significance

The Strang's Bush KNE site is of regional importance because:

- It contains highly **representative** ecosystems that were once typical or commonplace in the region
- It contains ecological features that are **rare or distinctive** in the region
- It contains high levels of ecosystem **diversity**, with several ecosystem types represented within the KNE site boundary, including several naturally uncommon ecosystems
- Its **ecological context** is valuable at the landscape scale as it contains a variety of inter-connected habitats and, provides core/seasonal habitat for threatened indigenous bird and plant species within the KNE site

Representativeness

The Threatened Environment Classification system⁹ indicates that the entire KNE site is a Category 1 environment (Acutely Threatened), existing in an area where less than 10% of indigenous cover remains.

According to Singers and Rogers classification, the current forest cover of mostly tōtara, tītoki forest (MF1) with some kahikatea, pukatea forest (WF8) closely resembles the historical forest cover modelled for this site (Appendix 1, Map 2). Historically, totara, titoki forest was widespread across the Wairarapa but today MF1 forest persists in only 4.1% of its historical extent in the Wellington region. Kahikatea, pukatea forest was historically common close to streams and rivers, however WF8 forest now persists in only 1.1% of its original extent in the region.

Rarity/distinctiveness

A small wetland area exists within the KNE. Wetlands are now considered an uncommon habitat type in the Wellington Region with less than 3% remaining of their original extent¹⁰.

New Zealand's national threat classification system¹¹ lists 1 vascular plant species and one bird species as nationally Threatened or At Risk within the KNE site. two plant species and two bird species present have also been listed as regionally threatened.

Nationally Threatened species are listed in Appendix 2 and regionally threatened species in Appendix 3.

Ecological context

Strang's Bush is one of the best examples of lowland podocarp forest remaining in the area. The site is isolated from other nearby forest remnants and ecosystems by intensive land use. While it has been modified by selective logging, grazing, pest animals and ecological weeds, it still retains most of its natural character. Strang's Bush contains mature, reproducing forest species that can provide a local genetic seed stock for revegetation efforts across the surrounding Makahakaha stream/Longbush Road catchment area. The wetland within the KNE site is a known migratory stopover for regionally threatened bird species.

6.3 Ecological features

The KNE site is approximately 200m above sea level and consists of rolling hills with occasional limestone and fossil shell outcroppings. The climate is warm to mild and drought-prone, typical of the eastern Wairarapa hill country. Small seeps in the hillside provide water to the wetland in the center of the KNE.

Vegetation communities and plants

Mixed tītoki (*Alectryon excelsus*) and tōtara (*Podocarpus totara*) forest dominates the drier and less fertile ridges and slopes of the site, and a pukatea (*Laurelia novae-zelandiae*) and kahikatea (*Dacrycarpus dacrydioides*)-forest community dominates the wetter and more fertile gullies. Scattered mataī (*Prumnopitys taxifolia*), kōwhai (*Sophora microphylla*), kānuka (*Kunzea ericoides*) and ngaio (*Myoporum laetum*) are also found across the KNE site amongst the dominant tītoki, tōtara, pukatea and kahikatea. The understory is dominated by a diverse range of small-leaved trees and shrubs, including the regionally uncommon korokio (*Corokia cotoneaster*)¹².

A recent botanical survey of the KNE site¹³ found that it contains the Nationally Vulnerable slender bristle grass (*Rytidosperma merum*) (see Appendix 2). Unusually, it also contains three species of maire (*Nestegis cunninghamii*, *N. lanceolata* and *N. montana*) and a number of other locally uncommon native species, including rasp fern (*Doodia australis*), small maidenhair (*Adiantum diaphanum*), bamboo grass (*Microlaena polynoda*), twiggy tree daisy (*Olearia virgata*), leafless lawyer (*Rubus squarrosus*), trailing fuchsia (*Fuchsia perscandens*), jointed fern (*Arthropteris tenella*), dwarf mistletoe (*Korthalsella lindsayi*) and mikimiki (*Coprosma linariifolia*).

Some of the plants that are found within the KNE site (eg rasp fern) are often associated with the limestone and exposed fossil shell outcrops present at the site. A tributary of the Makahakaha Stream feeds a small wetland area which contains a number of pūkiō (*Carex secta*) sedges.

Species

Birds

New Zealand pipit (*Anthus novaeseelandiae*), a nationally at-risk species (see Appendix 2), has been observed at Strang's Bush along with a number of more common native

forest birds, including kererū (*Hemiphaga novaeseelandiae*), tūī (*Prothemadera novaeseelandiae*), grey warbler (*Gerygone igata*), fantail (*Rhipidura fuliginosa placabilis*), bellbird (*Anthornis melanura*), swamp harrier (*Circus approximans*) and silvereye (*Zosterops lateralis*)¹⁴. Pied stilt (*Himantopus himantopus*) has been recorded in the wetland area in early spring.

Reptiles

Raukawa gecko (*Woodworthia maculata*) is the only lizard species observed at Strang's Bush¹⁵. The Ngahere gecko (*Mokopirirakau* "Southern North Island"), barking gecko (*Naultinus punctatus*), copper skink (*Oligosoma aeneum*) and northern grass skink (*Oligosoma polychroma*) have been recorded within a few kilometres and may also be present within the KNE site boundary¹⁶.

Invertebrates

Wellington tree wētā (*Hemidenina crassidens*) has been observed within the KNE¹⁷.

7 Threats to ecological values at the KNE site

Ecological values can be threatened by human activities, and by introduced animals and plants that change ecosystem dynamics. The key to protecting and restoring biodiversity as part of the KNE Programme is to manage key threats to the ecological values at each KNE site. Appendix 4 presents a summary of all known threats to the Strang's Bush KNE site.

7.1 Key threats

Ecological pest plants displace native plant species performing important structural and ecological functions such as providing food sources, shelter, roosts and refuge from predators for native fauna. They also inhibit the natural regeneration of native plant species. Old man's beard (*Clematis vitalba*) and English ivy (*Hedera helix*) are the highest priority species for control.

Pest animals prey on and displace native species while consuming native seeds and plants and disrupting vital ecological functions. Pest animals present throughout the KNE site include possums (*Trichosurus vulpecula*), mustelids (*Mustela* spp.), ship and Norway rats (*Rattus rattus* and *R. norvegicus*), mice (*Mus musculus*), hedgehogs (*Erinaceus europaeus*), feral cats (*Felis catus*), deer (Cervidae spp.), and rabbits (*Oryctolagus cuniculus*).

Stock are present in some parts of the KNE (see Appendix 1, Map 3) and disrupt the natural regeneration and ecological function of the site by consuming native groundcover and seedlings.

8 Vision and objectives

8.1 Vision

Forest and wetland ecosystems consisting of diverse native plant and animal populations and serving as a dispersal source for flora and fauna into the surrounding catchment, thus supporting local ecosystem regeneration

8.2 Objectives

Objectives help to ensure that operational activities carried out are actually contributing to improvements in the ecological condition of the site.

The following objectives will guide the operational activities at the Strang's Bush KNE site.

- 1. Enhance the forest regeneration processes to promote ecological diversity***
- 2. Protect rare and threatened species populations through predator removal and habitat improvement***

9 Operational activities

Operational activities are targeted to work towards the objectives above (Section 8). The broad approach to operational activities is described briefly below, and specific actions, with budget figures attached, are set out in the operational delivery schedule (Table 4).

9.1 Ecological weed control

The aim of weed control is to limit the impact of exotic species, maintaining the native biodiversity values and facilitating more natural functioning of the native ecosystem. Widespread species will be controlled first and longer-term as work progresses and resources allow, weed control work may expand to include other species.

Old man's beard has been controlled and dramatically reduced through previous work, but remains the highest priority species and will be controlled across the KNE site during all five years of this operational plan by Greater Wellington. Any remaining or regrowing large vines will be cut and stump-treated with herbicide. Smaller vines and seedlings will be sprayed with herbicide. Ongoing surveillance and follow up control will be undertaken to prevent re-establishment and allow native regeneration.

English ivy, aluminium plant and Darwin's barberry can be very damaging to New Zealand ecosystems; however, in this KNE site they are currently restricted to a few small areas. The one known Darwin's barberry site has been controlled in the past and is thought to be eradicated, but ongoing surveillance will be required. Ongoing surveillance and control of English ivy and aluminium plant across the entire KNE site will coincide with old man's beard control efforts.

Control of woody weeds such as hawthorn, elderberry, silver poplar, briar rose and wild cherry will be done using the cut and stump-treat method with a focus on eliminating larger, fruiting age specimens. At their current densities they are a lower priority for control at this KNE site. Woody weed control efforts will consist of focused efforts in sequential designated areas each year, with the intention of "sweeping" across the KNE site over the course of five years (see Table 4).

Planned retirement of the remaining grazed block (Appendix 1, map 3) within the KNE site is expected to result in a resurgence of native and invasive seedlings. Weed control in this area post-retirement (2024-2026) will focus on promoting native regrowth and preventing establishment of invasive species.

9.2 Pest animal control

The aim of pest animal control is to protect the biodiversity values present and achieve the management objectives for this KNE site.

A multi-species approach to animal pest control¹⁸ was installed in 2015 and reviewed in 2017, with 21 control locations installed across the KNE site. Each control location contains a Sentry bait station, DOC250 kill-trap and a Timms kill-trap. This system design targets mustelids, feral cats, rats and hedgehogs. Trap and bait station distribution is insufficient to control possums to a low density, but does have some impact on their populations. The Greater Wellington Biosecurity department services all hardware at the control locations 12 times annually. See Appendix 1, Map 4 for pest animal control locations.

Deer (red and fallow), rabbits and hares will be controlled by the landowner with Greater Wellington providing ongoing advice and technical support if required. These species can significantly damage forest understory and composition through selective browsing.

9.3 Revegetation

The aim of revegetation work is to increase the extent of native vegetation in the KNE site and protect against the ingress of ecological weed species. Native seed production within the KNE site is high, and protection of naturally established seedlings will be prioritized over planting. If feasible, plant protectors will be provided to the landowner to install around seedlings within the KNE site. To the best of our knowledge, no native planting has ever been done with the Strang's Bush KNE site. Therefore the native plant communities there are probably more representative of pre-agriculture genetic diversity than other, more-heavily managed sites. For this reason, GWRC discourages the planting of nursery-grown native plants until more location-specific eco-sourcing of seeds can be realized.

9.4 Stock exclusion and fencing

A farm track will be maintained for stock movement purposes through the KNE site. The landowner will maintain all stock fencing protecting the KNE site and is scheduled to retire further areas from grazing by 2027, further enhancing protection from stock and feral ungulates.

9.5 Vegetation Monitoring

Strang's Bush is part of a long term forest health study undertaken by Environmental Science department at Greater Wellington. Insights from this work will help inform KNE site's management. A survey was conducted in summer 2021/2022 and the next survey is scheduled for summer 2026/2027.

10 Future opportunities

10.1 Vertebrate monitoring

Lack of an established monitoring regimes for birds, lizards, and invertebrates makes determining changes in forest and wetland ecosystem health difficult. Prior bird counts are all informal observations and there are no records of formal monitoring efforts for reptiles or invertebrates within the KNE. The landowner has expressed an interest in having local volunteer groups conduct biodiversity surveys within the KNE site. Greater Wellington will support the landowner in implementing citizen science observation and monitoring within the KNE site, including providing expert advice and identification resources.

11 Operational delivery schedule

The operational delivery schedule shows the actions planned to achieve the stated objectives for the Strang's Bush KNE site, and their timing and cost over the five-year period from 1 July 2022 to 30 June 2027. Budget for years 2023/24 to 2026/27 are indicative only and subject to change and adjusted for inflation in accordance with the Long Term Plan. Operational areas can be found in Appendix 1 – Map 3. Ecological weed (EW) and pest animal (PA) designations are described further in appendices 4 and 5.

Table 2: Five-year operational plan for the Strang's Bush KNE site

Objective(s)	Activity/Actions	Operational area	Intended outcome	Implementing party	Timetable and resourcing where allocated				
					2022/23	2023/24	2024/25	2025/26	2026/27
1, 2	Climbing ecological weed (EW-3) control	Entire KNE site	Eliminate mature climbing weeds and reduce seedling/sapling distribution and density to 'patchy and sparse'	GWRC Biosecurity	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
1, 2	Ground covering ecological weed (EW-1) control	Entire KNE site	Suppress ground covering weed distribution and density to 'patchy and sparse'	GWRC Biosecurity	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
1, 2	Woody ecological weed (EW-2) control	Area B	Eliminate large specimens. Reduce distribution and density to 'patchy and sparse'	GWRC Biosecurity	\$2,000	\$2,000			
		Area A					\$2,000	\$2,000	
		Area C							\$2,000
1, 2	Pest animal (PA-1,2,3,4,6) control	Entire KNE site	Possums <5% RTC*, Rats <10% TTI**	GWRC Biosecurity	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
2	Pest animal (PA-7,9) control	Entire KNE site	Control rabbits, hare and deer as required and funded by landowner	Landowner	n/a [#]	n/a [#]	n/a [#]	n/a [#]	n/a [#]
1	Natural Forest Monitoring	Area A	Monitor forest composition and assess regeneration and pest animal impacts	GWRC Environmental Science					Funded by ESCi

*RTC = Residual Trap Catch. The control regime has been designed to control possums to this level but monitoring will not be undertaken. Experience in the use of this control method indicates this target will be met

**TTI = Tracking Tunnel Index. The control regime has been designed to control rats/mustelids to this level but monitoring will not be undertaken. Experience in the use of this control method indicates this target will be met

12 Funding contributions

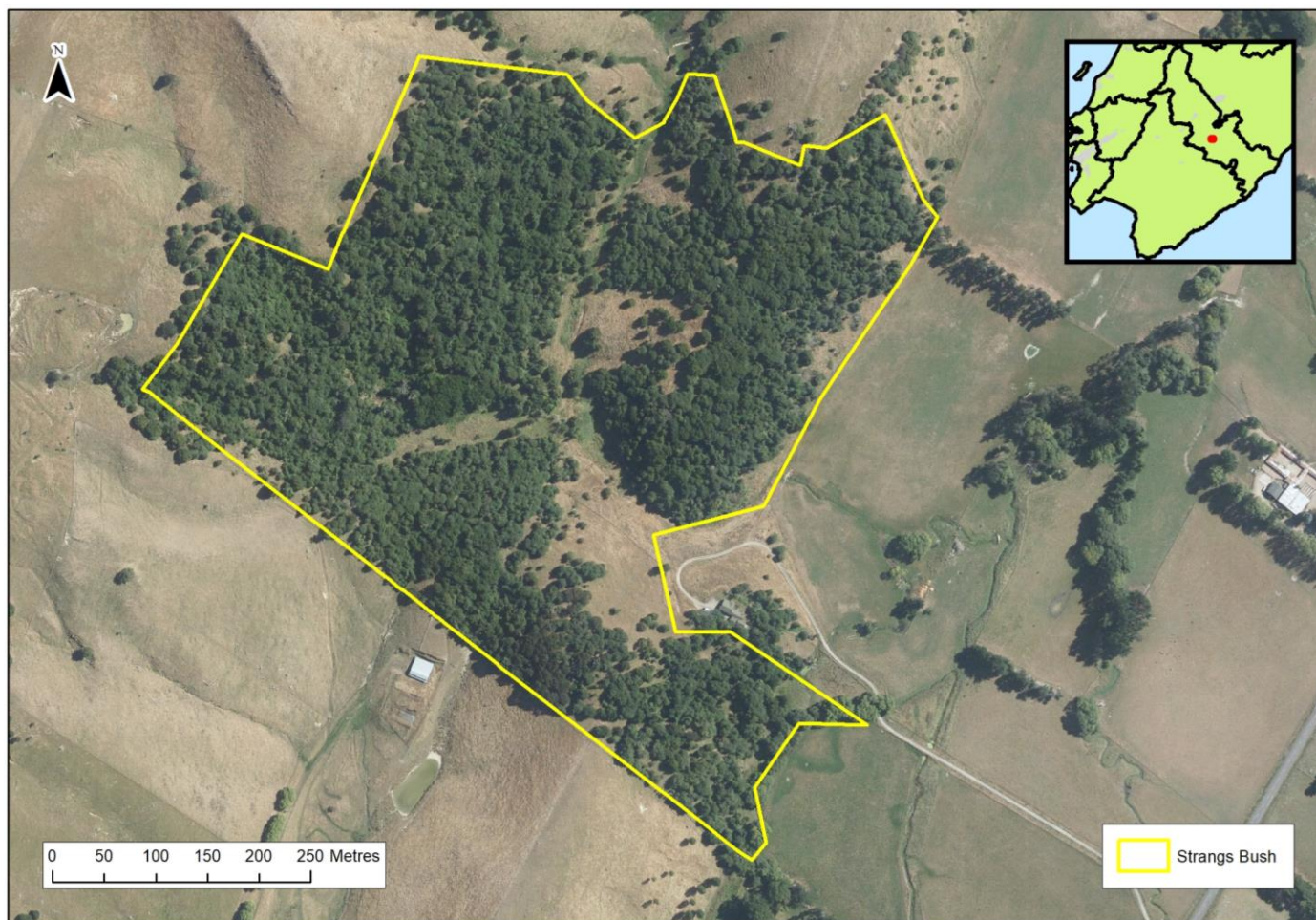
12.1 Budget allocated by Greater Wellington

The budget for the years 2023/24 through 2026/27 are indicative only and subject to change.

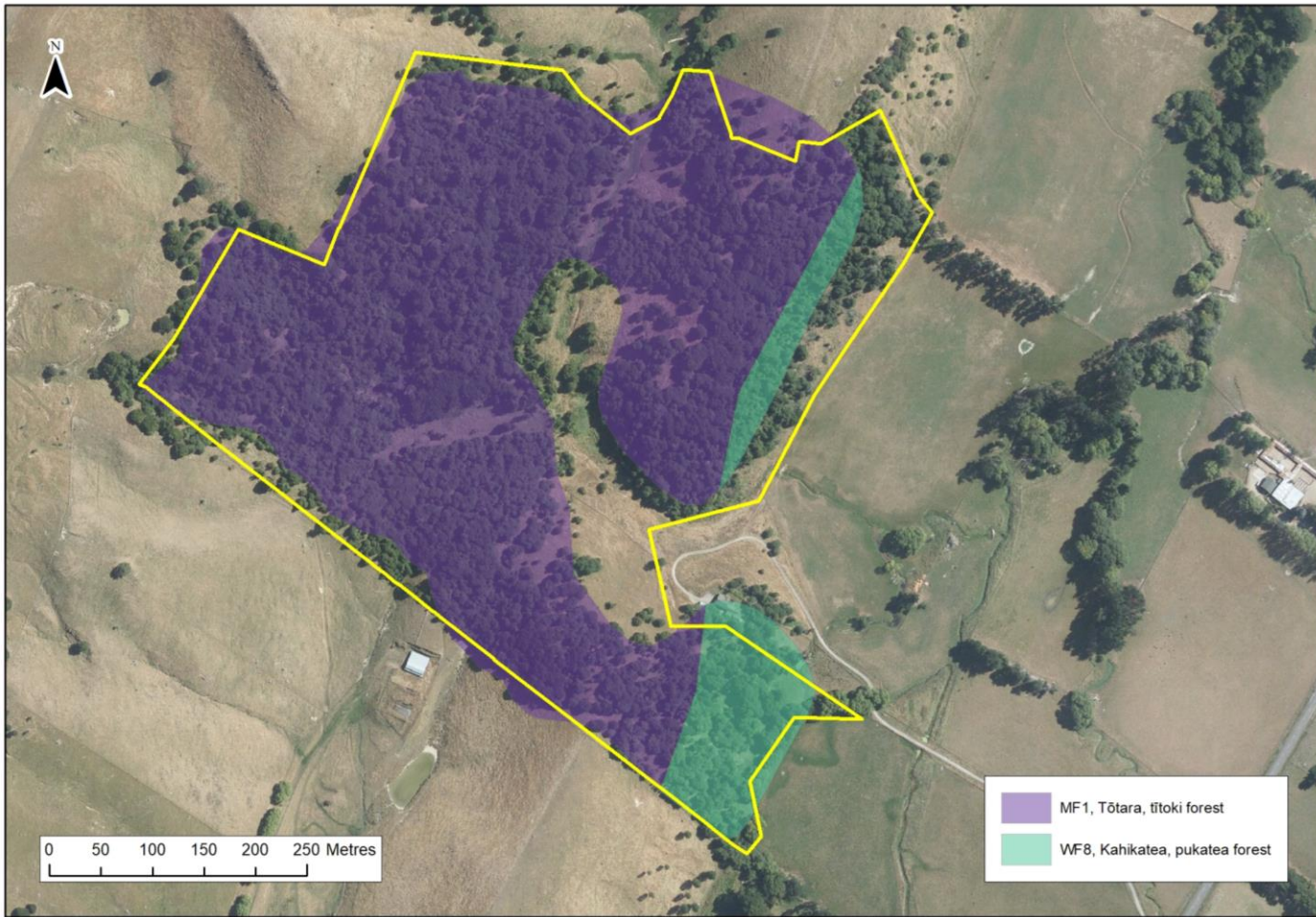
Table 3: Greater Wellington allocated budget for the Strang’s Bush KNE site

Management activity	Annual GWRC budget
Ecological weed control	\$6,000
Pest animal control	\$5,000
Total	\$11,000

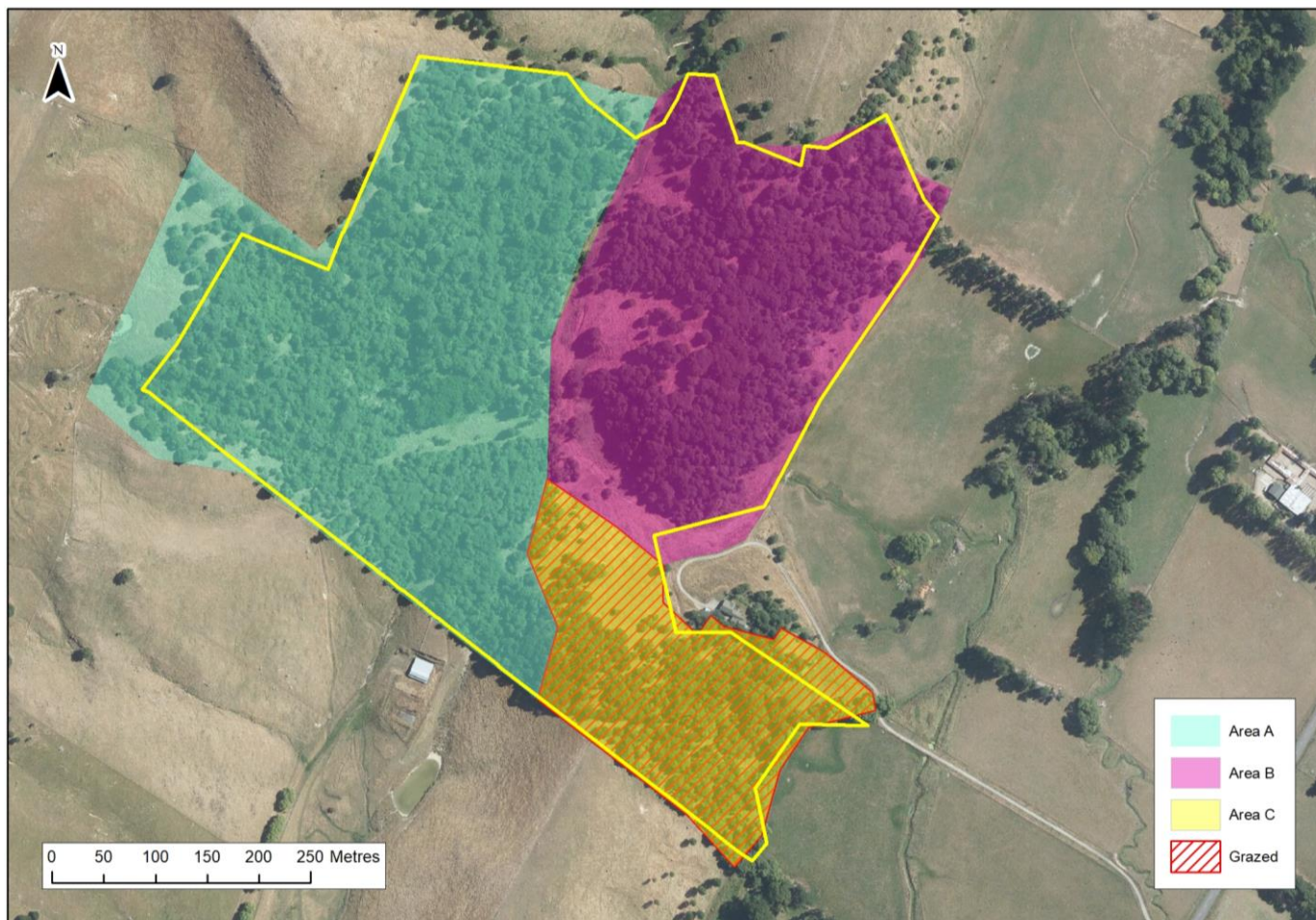
Appendix 1: Site maps



Map 1: The Strang's Bush KNE site boundary



Map 2: Existing forest cover types for the Strang's Bush KNE site



Map 3: Weed control operational areas and grazing status for the Strang's Bush KNE site



Map 4: Pest control locations in the Strang's Bush KNE site

Appendix 2: Nationally threatened species list

The New Zealand Threat Classification System lists species according to their threat of extinction. The status of each species group (plants, reptiles, etc) is assessed over a five-year cycle¹⁹. Species are regarded as Threatened if they are classified as Nationally Critical, Nationally Endangered or Nationally Vulnerable. They are regarded as At Risk if they are classified as Declining, Recovering, Relict or Naturally Uncommon. The following table lists Threatened and At Risk species that are resident in, or regular visitors to, the Strang's Bush KNE site.

Table 4: Threatened and At Risk species at the Strang's Bush KNE site

Scientific name	Common name	Threat status	Observation
Plants(vascular) ²⁰			
<i>Rytidosperma merum</i>	Slender bristle grass	At Risk – Declining	Enright et al 2014 ²¹
Birds ²²			
<i>Anthus novaeseelandiae</i>	New Zealand pipit	At Risk – Declining	Marilyn Strang pers comm. 2014

Appendix 3: Regionally threatened plant species list

The following table lists regionally threatened species that have been recorded in the Strang's Bush KNE site.

Table 5: Regionally threatened plant species recorded in the Strang's Bush KNE site

Scientific name	Common name	Threat status	Observation
Plants ²³			
<i>Korthalsella lindsayi</i>	Dwarf mistletoe	At Risk – Naturally Uncommon	Enright et al 2014 ²⁴
<i>Rytidosperma merum</i>	Slender bristle grass	Threatened – Critical	Enright et al 2014 ²⁵
Birds ²⁶			
<i>Anthus novaeseelandiae</i>	New Zealand pipit	Regionally vulnerable	Marilyn Strang pers comm. 2014
<i>Hemiphaga novaeseelandiae</i>	New Zealand pigeon; Kereru	At risk, recovering	Cooper French pers obsv. 2021
<i>Himantopus</i>	Pied Stilt	Regionally Vulnerable	Cooper French pers obsv. 2021

Appendix 4: Threat table

Table 6: Threats to the Strang's Bush KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
Ecological weeds (see full list in Appendix 5)		
EW-1	Ground covering ecological weeds smother and displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key ground covering ecological weed species for control include English ivy (<i>Hedera helix</i>) and aluminium plant (<i>Lamium galeobdolon</i>)	Entire KNE
EW-2	Woody weed species displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key woody ecological weed species include hawthorn (<i>Crataegus monogyna</i>), elderberry (<i>Sambucus nigra</i>), silver poplar (<i>Populus alba</i>), briar rose (<i>Rosa rubiginosa</i>), wild cherry (<i>Prunus</i> spp.) and Darwin's barberry (<i>Berberis darwinii</i>)	Entire KNE
EW-3	Climbing weeds smother and displace native vegetation often causing canopy collapse, inhibit indigenous regeneration, and alter vegetation structure and composition. Key climbing ecological weed species include old man's beard (<i>Clematis vitalba</i>) and English ivy (<i>Hedera helix</i>)	Entire KNE
Pest animals		
PA-1	Possums (<i>Trichosurus vulpecula</i>) browse palatable canopy vegetation until it can no longer recover ^{27,28} . This destroys the forest's structure, diversity and function. Possums may also prey on native birds and invertebrates ²⁹	Entire KNE
PA-2	Rats (<i>Rattus</i> spp.) browse native fruit, seeds and vegetation. They compete with native fauna for food and can reduce forest regeneration. They also prey on invertebrates, lizards and native birds ^{30,31}	Entire KNE
PA-3	Mustelids (stoats ^{32,33} (<i>Mustela erminea</i>), ferrets ^{34,35} (<i>M. furo</i>) and weasels ^{36,37} (<i>M. nivalis</i>)) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions	Entire KNE
PA-4	Hedgehogs (<i>Erinaceus europaeus</i>) prey on native invertebrates ³⁸ , lizards ³⁹ and the eggs ⁴⁰ and chicks of ground-nesting birds ⁴¹	Entire KNE
PA-5*	House mice (<i>Mus musculus</i>) browse native fruit, seeds and vegetation, and prey on invertebrates. They compete with native fauna for food and can reduce forest regeneration. They also prey on invertebrates, lizards and small eggs and nestlings ^{42,43}	Entire KNE
PA-6	Pest and domestic cats (<i>Felis catus</i>) prey on native birds ⁴⁴ , lizards ⁴⁵ and invertebrates ⁴⁶ , reducing native fauna breeding success and potentially causing local extinctions ⁴⁷	Entire KNE
PA-7	Rabbits (<i>Oryctolagus cuniculus</i>) and hares (<i>Lepus europaeus</i>) graze on palatable native vegetation and prevent natural regeneration in some environments.	Entire KNE

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
PA-8*	Wasps (<i>Vespula</i> spp.) adversely impact native invertebrates and birds through predation and competition for food resources. They also affect nutrient cycles in beech forests ⁴⁸	Entire KNE
PA-9	Red deer (<i>Cervus elaphus</i>) and fallow deer (<i>Dama dama</i>) browse the forest understory and can significantly change vegetation composition by preferential browsing and preventing regeneration ^{49,50,51}	Entire KNE
Human activities		
HA-1*	Agricultural practices, particularly grazing livestock can result in pugging soils, grazing native vegetation inhibiting regeneration, wildlife disturbance and increasing nutrient content of soils and watercourses ⁵²	Area C
Other threats		
OT-1	Small forest remnants are affected by environmental impacts on their edges such as changing environmental conditions (eg, soil moisture or temperature levels), changing physical environment (eg, different plant assemblages compared to the interior) and changing species interactions (eg, increased predation by invasive species) ^{53,54}	Entire KNE
OT-2*	A lack of legal protection can leave a site at risk of future development or destruction and resources invested in the site may be wasted. Part of this KNE site is private property and uncovenanted, having no protection status	Entire KNE

*Threats marked with an asterisk are not addressed by actions in the operational delivery schedule

Appendix 5: Ecological weed species

The following table lists key ecological weed species that have been recorded in the Strang's Bush KNE site by Greater Wellington Regional Council Biosecurity and Biodiversity teams.

Table 7: Ecological weed species recorded in the Strang's Bush KNE site

Scientific name	Common name	Threat code	Distribution 2022
<i>Berberis darwinii</i>	Darwin's barberry	EW-2	Not found
<i>Clematis vitalba</i>	Old man's beard	EW-3	All areas
<i>Crataegus monogyna</i>	Hawthorn	EW-2	All areas
<i>Hedera helix</i>	Ivy	EW-1, EW-3	Area C
<i>Lamium galeobdolon</i>	Aluminium plant	EW-1	Area C
<i>Populus alba</i>	Silver poplar	EW-2	Area C
<i>Prunus</i> spp.	Wild cherry	EW-2	Area C
<i>Rosa rubiginosa</i>	Briar rose	EW-2	Entire KNE
<i>Sambucus nigra</i>	Elderberry	EW-2	Entire KNE
<i>Ulex europaeus</i>	Gorse	EW-2	Areas A & B

References

- ¹ New Zealand legislation. 1991. Resource Management Act 1991.
- ² Greater Wellington Regional Council. Greater Wellington Regional Council Long Term Plan Ko Te Pae Tawhiti: 2021 – 2031.
- ³ Greater Wellington Regional Council. 2016. Greater Wellington Regional Council Biodiversity Strategy. <http://www.gw.govt.nz/assets/council-publications/Biodiversity-Strategy-2016.pdf>
- ⁴ Greater Wellington Regional Council. Proposed Natural Resources Plan for the Wellington Region. 2019.
- ⁵ Greater Wellington Regional Council. 2019. Greater Wellington Regional Pest Management Plan 2019–2039. GW/BIO-G-2019/74
- ⁶ Greater Wellington Regional Council. 2020. Toitū Te Whenua Parks Network Plan 2020-2030.
- ⁷ Department of Conservation. 1987. Ecological Regions and Districts of New Zealand.
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